CATEGORIZATION OF EVERYDAY OBJECTS:A CROSS-LINGUISTIC IRT-STUDY

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1. Introduction

Cross-linguistic research has shown that boundaries for lexical categories differ from language to language (Malt, Sloman, Gennari, Shi & Wang, 1999): different languages cut up the world in different ways

A differential item functioning analysis (DIF) revealed large language differences between the structure of equivalent categories.

Can we distinguish Dutch from French participants based on response patterns in a categorization task?

2. Method

Materials: Stimulus set with known language differences in categorization: (Ameel, Storms, Malt & Sloman, 2005)

3 roughly equivalent category pairs in French and Dutch
fles-bouteille-flacon (bottle), pot-pot (jar), doos-boîte (box)

40 items per category:
good, borderline, and bad examples of target category

Task: category judgment task
"Is this a bottle?" yes/no

Participants:
monolingual Dutch- and French-speaking Belgian adults (age 17 to 75)

Dutch	French
fles: 437	bouteille: 308
pot: 434	flacon: 309
doos: 448	pot: 310
bus: 436	boîte: 323

Model analysis: mixture IRT-model

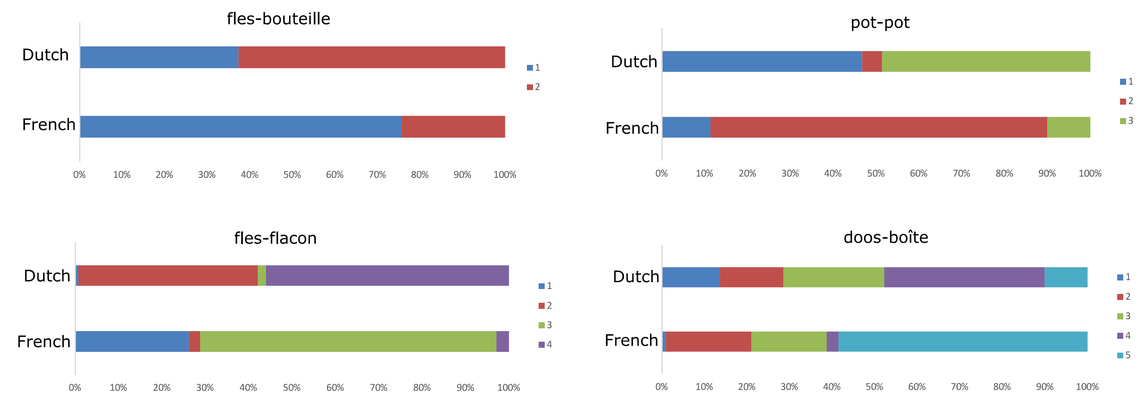
$$\Pr(Y_{ci}=1)=\frac{e^{\alpha g(\beta_{gi}-\theta_c)}}{1+e^{\alpha g(\beta_{gi}-\theta_c)}}$$

See also: Verheyen, Voorspoels & Storms, 2015

3. Results

We identified a number of latent groups of categorizers per category pair by means of a mixture IRT– analysis:
fles-bouteille: 2 groups, pot-pot: 3 groups, fles-flacon: 4 groups, doos-boîte: 5 groups

Do these groups match the distinction between Dutch– and French spaking participants?



Only a partial determination of group membership by language.

Which participant characteristics other than language determine group membership?

Multinomial logistic regression: prediction of group membership based on:

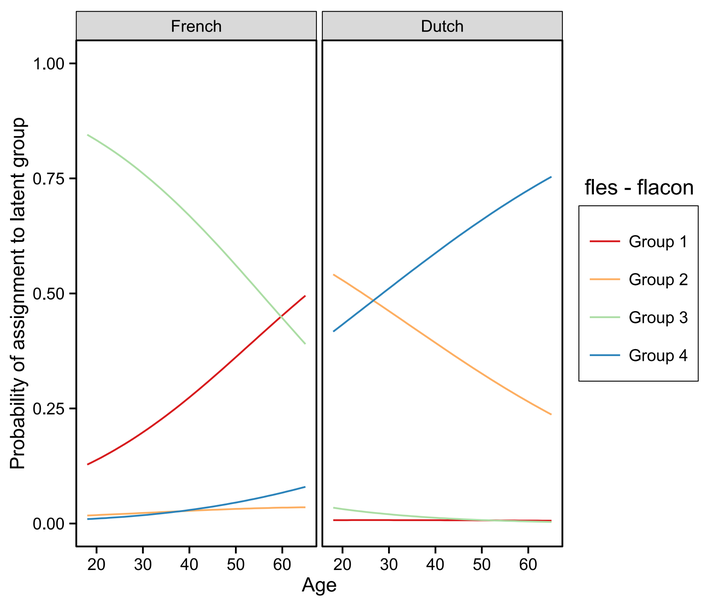
Education level: no significant contribution

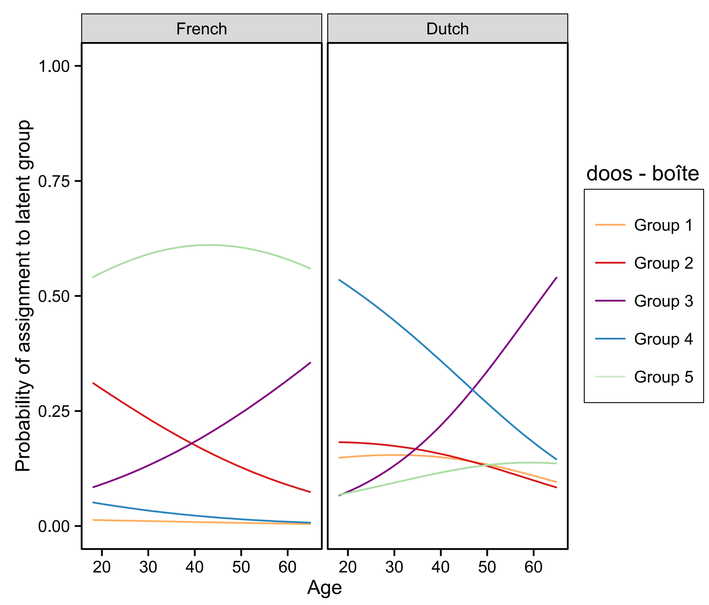
Gender: no significant contribution

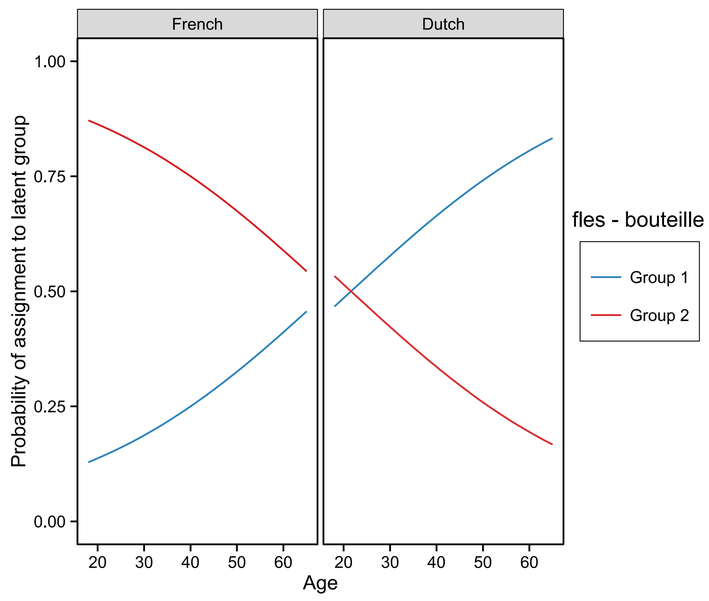
Age: significant contribution for all categories ($p<0.0001$)

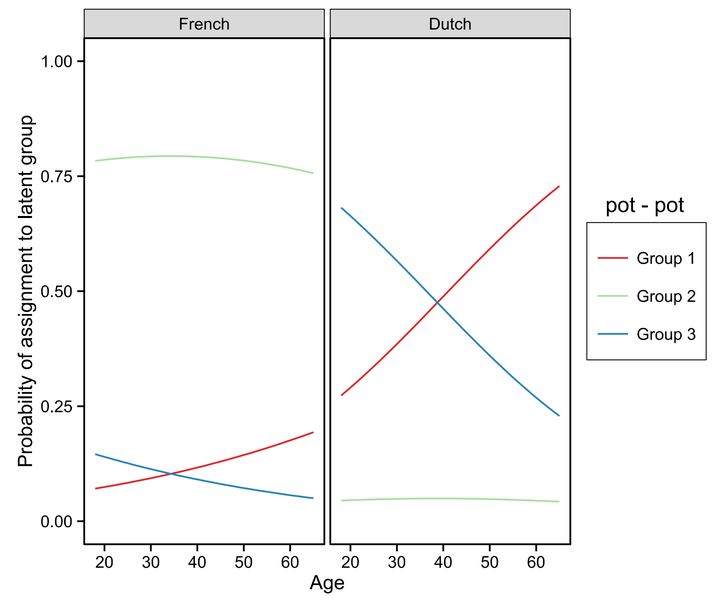
Language: significant contribution for all categories ($p<0.0001$)

The graphs below represent the probability of being assigned to a latent group in function of language and age.









4. Conclusions

The mixture IRT-analysis does not succeed in distinguishing Dutch-speaking from French-speaking participants.
→ variation within a language might be blurring the cross-linguistic distinction

Other factors than language influence categorization behavior.
→ age plays a significant role in the prediction of membership of a particular group of categorizers.

Complex patterns of lexical variation exist even for categories of everyday objects. They appear not only to be shaped by language, but also by age.

References

Ameel, E., Storms, G., Malt, B. C., & Sloman, S. A. (2005). How bilinguals solve the naming problem. Journal of Memory and Language, 53(1), 60–80. doi:10.1016/j.jml.2005.02.004

Malt, B. C., Sloman, S. A., Gennari, S., Shi, M., & Wang, Y. (1999). Knowing versus Naming: Similarity and the Linguistic Categorization of Artifacts. Journal of Memory and Language, 40(2), 230-262. doi:doi:10.1006/jmla.1998.2593

Verheyen, S., Voorspoels, W., & Storms, G. (2015). Inferring choice criteria with mixture IRT models: A demonstration using ad hoc and goal-derived categories. Judgment and Decision Making, 10, 97-114.

Further Information

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